## A Nationwide Network Unlike any Before

Legislation established the First Responder Network Authority (FirstNet), an independent authority within the National Telecommunications and Information Administration, as the responsible entity for the creation of a nationwide public safety broadband network. A broadband network can provide public safety with the ability to quickly exchange large amounts of data across long distances creating access to video, mapping, Global Positioning System applications, and more. However, capacity limitations, quality of service, and other similar issues add to the complexity of this network build out. Additionally, neither public safety nor the Federal Government has ever built a dedicated broadband network.

## Network Deployment Analysis

Recognizing that public safety communications will continue to evolve with the introduction of a public safety specific broadband network, and critical voids will have to be addressed, the Office for Interoperability and Compatibility (OIC) in partnership with the U.S. Department of Commerce's Public Safety Communications Research (PSCR) program and the National Institute of Standards and Technology (NIST) Information Technology Laboratory (ITL) are conducting modeling and analysis research on deployment of this network. This project uses commercially available off-the-shelf network planning and simulation tools and develops additional models and measurement tools as needed. As public safety begins to deploy their communication systems on a broadband network, they need to be able to truly understand emerging network technologies to maximize the use of this investment. This project's nationwide modeling approach provides public safety with the ability to evaluate network deployment scenarios and investigate how well new technologies support public safety requirements through analysis of smaller representative sample areas and extrapolation of that data to larger areas.

These tools can also be used to optimize network configurations (e.g., sector antenna directions, transmission powers) for various optimization criteria (e.g., maximum coverage area). Network analyses can be used to predict performance metrics over a defined geographic area. Examples of critical metrics include coverage and data rate (i.e., the amount of data or information being sent per a specific unit of time, such as a second). These are important because a first responder must know their device is able to communicate and to effectively send/receive data.

## Making a $7 Billion Investment Efficient and Effective

Also included in this landmark public safety legislation was a $7 billion federal investment for the development of this broadband network. OIC, PSCR, and NIST ITL's efforts will help FirstNet and public safety leverage modeling and simulation tools to make more informed procurement decisions for everything from user equipment to network infrastructure. Further, the project will provide public safety a better understanding of the factors that affect performance; these insights on the performance trends and trade-offs will also lessen the risk of wasted investments. This project arms public safety with the performance analysis tools needed to evaluate network deployment scenarios, investigate how well new technologies support public safety requirements, and develop quantitative requirements for public safety communications. It will provide FirstNet and public safety with needed network information as they consider issues such as how many cellular towers are needed in a given area to provide an appropriate level of coverage for responders' communications devices.
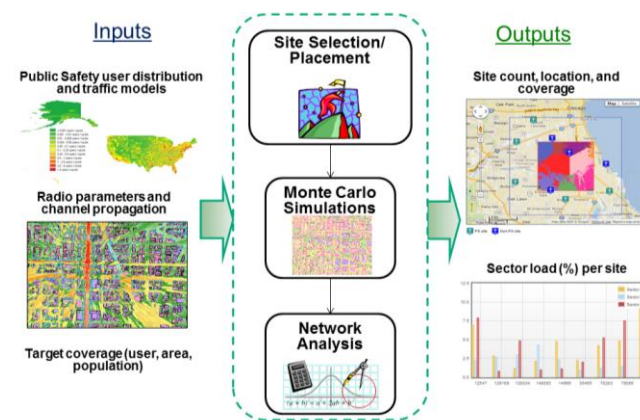


Network Modeling and Performance Analysis

## Next Steps

OIC, PSCR, and NIST ITL will examine the effects of large incident scenarios and network equipment failures on the network performance. The team plans to also release a lessons learned report on the public safety broadband network performance modeling.